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The attempt is made to develop a structure of costs which expresses the functional components of 12 Great Cities programs(Baltimore, Boston, Chicago, Cleveland, Detroit, Houston, Los Angeles, Milwaukee, New York, Philadelphia, Pittsburgh, and St. Louis). The most fundamental component is the instructional unit, defined as a full-time teacher for a specified teaching area for a given number of pupils. Administration and specialized services, such as counseling and equipment, are evaluated in terms of support to the teacher. Basic costs reveal that the average cost per pupil in elementary schools ranges from $185 in Houston to $297 in New York. The average cost for all of the cities is $250 per pupil. Two factors are found to account for the discrepancies-teacher's salaries and pupil-teacher ratios. In regular high school programs average cost per pupil is $323 while in special programs, the average is $462. Teachers receive approximately 51% of all salaries paid for the function of teaching in elementary schools while 42.8% is received in high schools. Costs of capital outlay are considered in terms of elementary, junior high and senior high schools. Comparitive analyses are presented with tables. Data is included on pupil distribution, pupil-teacher ratios, teacher salaries, non-teaching staff salaries, expenses for community services, secretaries and custodians, retirement funds, night school and summer school.

The current study was preceeded by: 1) a project concerned with estimating and describing needed operating and capital expenditures from 1960 to 1965, potential revenues which might be expected from local tax sources and state aid provisions evaluated in 1960 and patterns of revenue allocation, and 2) a project to identify functional parts or components of programs and services for which cost data could be collected.

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HARVARD GRADUATE SCHOOL OF EDUCATION
CENTER FOR RESEARCH & DEVELOPMENT

THE STRUCTURE OF EDUCATIONAL COSTS IN THE GREAT CITIES

by

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Research Council of the
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INTRODUCTION

This study is an extension of a line of investigation of school costs which the writer has been conducting during the past three years for the Great Cities Program for School Improvement. The origin of the current project dates back to the initial project FISCAL POLICIES OF THE GREAT CITIES IN THE UNITED STATES which the writer submitted on November 8, 1961 to the Great Cities School Improvement Studies Group.

The First Project

This project was concerned with estimating and describing three aspects of the fiscal problem of the great city school systems:

(1) an estimate of needed operating and capital expenditures from 1960 to 1965 based on conservative standards of staffing and housing.

(2) an estimate of the potential revenue which might be expected from local tax sources and state aid provisions available to the school systems in 1960, and

(3) the pattern of revenue allocation and the controls attached to the administration of respective tax sources at the local and state levels of government.

The findings of this study pointed up the financial plight of the great city school systems. Most of the fiscal problem could be explained by rising costs, extra costs arising from a high proportion of disadvantaged youth, and lack of sufficient access to tax resources for adequate support. The study provided information from which was published a statement[1] of principles or guides for improvement of fiscal policies in cities as well as in all types of school districts.

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[1] The Research Council of the Great Cities Program for School Improvement. Fiscal Policies to Meet the Needs of the Great City School Systems in America. Chicago: The Council, 228 North LaSalle Street, 1963.

Aside from the magnitude of the fiscal problem the next most impressive finding of the study was the evidence of uniqueness about the cost of education in the great city school systems. A very conservative estimate showed that about eleven per cent of the professional staff was devoting service to seven per cent of the school population which needed special programs of one kind or another. The total number of staff members in relation to the school population was low compared with most school systems in the nation. For this reason comparative statistics on unit costs of city schools and other districts were unrealistic. Capital costs were not comparable to other types of communities because of high prices of sites and other components.

The Second Project

The findings of the first study clearly pointed up the need for more knowledge about the specific nature of school costs. Education had become a vastly complex enterprise. Despite whatever inadequacies might have existed the school systems had established elaborate organizations of programs and services in an attempt to meet the needs of every student. Some programs and services were taking on shape or structure of distinctive character, making it possible to count pupils and resources respectively.

The traditional structure of school budgets was not adequate to show the composition of costs in relation to the programs and services which the school systems were operating to meet the educational needs of their students. Educational leaders were finding increasing difficulty in the wake of growing complexity of the educational operation to evaluate, to justify, and to interpret educational costs and the degree of adequacy of a given school budget. More specific knowledge about the nature of school costs was needed also to apply sound principles of fiscal policy in state aid plans.

These observations led the writer to concentrate next on an exploration of the nature or structure of educational costs in the great cities. The second project gave the writer an opportunity not only to analyze the make-up of educational costs in the great cities but also a chance to compare the results with a similar study which he was conducting independently in a representative group of 12-grade systems in Illinois excluding Chicago.

The second project[2] was completed on March 8, 1963. The approach in that project was to identify functional parts or components of programs and services for which cost data could be collected. The composition of the student population appeared to be the best clue to the variations in programs and services. There was evidence that some programs were more expensive than others for equivalent numbers of students. Some services appeared to be more expensive in some schools than others because of the high incidence of retardation, emotional imbalance, high mobility, high proportion of slow learners and other characteristics of the student population.

To a great extent the characteristics of students seemed to be related to certain socio-economic characteristics of the general population. Hence, an effort was made to identify some of the characteristics of the general population in the great cities which could be related to school costs.

Samples of disadvantaged and advantaged areas in ten cities were picked for study. The advantaged areas were believed to be comparable to suburban communities and small cities. The contrasts between these two types of communities within the cities were great. Density of the general population in the disadvantaged areas ranged from 9,000 to 28,000 persons per square mile, while

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[2] McLure, William P., Consultant. Some Determinants of Educational Costs in Eleven Great Cities. Chicago: Research Council of the Great Cities Program for School Improvement, 228 North LaSalle Street, March 8, 1963, mimeographed, 65 pp.

in the latter areas the figure was from one-half to one-fourth as great. The disparity in density of pupil population was even greater. In the areas of greatest concentration there were over 6,000 pupils per square mile. Other characteristics of wide disparity were median family income, average educational level of adults, proportion of adult workers in professional and technical occupational groups, degree of unemployment, and incidence of substandard dwellings.

A comparison of data on pupils from these same areas showed that the pupils in the disadvantaged areas had lower achievement scores in reading and arithmetic, a higher proportion of students in special classes for mentally and physically handicapped, a lower average daily attendance in school, a higher rate of mobility during the year, and a higher percentage of dropouts.

These characteristics of students and the general population were helpful to describe the problems of education in these cities. However, the writer was unable to obtain a breakdown of costs in appropriate forms to test any specific relationships between the socio-economic characteristics of either the student or the general population and the make-up of costs. School costs are increased under conditions of high density of population with certain social characteristics. Such conditions as high proportion of slow learners and high rate of mobility of pupils increase the cost of education. The problem is to find a feasible method by which the data on characteristics of the population can be translated into terms of cost.

The writer postulated that a more fruitful way to analyze the structure of costs would be in relation to composition of educational programs and services offered for students rather than the socio-economic characteristics of the population. Programs and services represent the response of the school system to the educational needs of the students and to the demands of society.

Such a structure based on the composition of programs in effect at any moment reflects only the status quo. But it does provide a basis for estimating how far actual practice falls short of any defined goal. Since practice changes from year to year, so will the structure of costs change.

The plan of the study was to identify functional parts of the educational program in the elementary schools and the junior and senior high schools for which distributions of students, teachers, non-teaching professional staff members, staff members for supportive services and material resources could be made. The principle involved is functional analysis; i.e., functions for which staff and other resources are allocated in relation to the pupils served.

The general plan of the study was only partially completed in the second project. The analysis of costs was restricted to high schools because of time limitations. A sample of 26 high schools with range of extreme emphasis from the vocational and technical subjects to the academic fields was selected from ten cities. Allocations of student enrollees and time of teachers were distributed among eight instructional fields. Total non-teaching time of professional staff was obtained but it could not be allocated to fields of instruction.

Only the costs of salaries of teachers could be prorated among instructional fields. Accounting procedures in the school systems did not yield a breakdown of expenditures other than teachers' salaries which could be prorated in this manner. Teachers' salaries represented over half of the operating budgets. Hence they provided a basis for determining the structure of costs in high schools and for pointing up the fundamental variations in programs and services. The three factors which were found to determine the cost of a given instructional load in any field were: (1) pupil-teacher ratio, (2) average salary of teachers in the field, and (3) other costs of services and materials to support the teaching function. The costs of services and materials were known to vary among instructional fields but they could not be prorated.

The component of the educational programs in the sample of high schools which stood out highest in the proportion of instructional load, staff time and costs was the area of vocational and practical arts. This field added an estimated 18 per cent to the cost of education in the sample of 26 high schools. This extra cost can be attributed to the high proportion of students who are provided a large part of their education in the vocational and practical arts field at a higher average per pupil expense than in other fields.

Concurrently with this project the writer conducted a similar analysis of costs of high schools in 36 representative 12-grade districts in Illinois. In this sample the offering in the vocational-practical arts field increased the total operating costs by an estimated 15 per cent in districts with less than 600 pupils in high school and only 10 per cent in districts with 600 to 4500 pupils in high school.

The average of the 26 high schools in the ten great cities is believed to be representative of all high schools in Chicago. If this is true, the high schools in this system have an extra cost of about eight per cent higher than high schools in the next largest group of districts in the state of Illinois. This extra cost can be attributed to a higher proportion of students receiving instruction in the area of vocational-practical arts. The difference in cost of high school education among districts is the type of statistic which could be applied in the state aid law to adjust for fundamental variations in cost.

This approach to cost analysis of education in the high school is less difficult to apply in smaller districts because of the smaller volume of data to collect. The procedure was not used to examine the costs in all high schools in the great cities because of the task of collecting data on every high school. In time these systems will undoubtedly collect and store such information as electronic data processing equipment becomes available.

A similar approach to analysis of costs in elementary schools was not completed and the project was terminated to redesign the approach as a result of experiences and observations thus far.

THE PRESENT STUDY

The basic premise of the preceding project has not changed in the present study. That is, if functional components of educational programs and services can be broken down into sufficiently small packages or groups so that the respective resources of personnel and material can be prorated, it will be possible to develop a new and useful structure of educational costs. It will then be possible to evaluate better the make-up of costs in a particular school system. As changes in specific components are planned the cost effects can be ascertained readily. And it will be possible to make more realistic comparisons among school systems since commonalities and differences will be more obvious than present structures permit.

Two types of costs are analyzed in this study, one of current operating expenses and the other of capital outlay. Under modern conditions of local, state and federal participation in school support, it is difficult to conceive a financial plan in any state which can be adequate without a comprehensive measurement of all essential elements of cost associated with capital and operating needs.

Rationale for Costs of Operation

Operating costs of eleven great city school systems have been broken down into eleven components. The module of cost is a pupil unit equated to the average per pupil expenditure for teachers' salaries in regular programs of elementary schools. The size of each cost component may be expressed in number of pupil units equivalent in cost to the module.

The development of the structure of operating costs is described step by step as follows:

Step 1: Distribution of Pupils. The first step is to count the number of pupils in regular and special programs in elementary schools and in junior and senior high schools. Pupils are counted in six special programs where most if not all of their instruction is in special groups which operate practically independently from other pupils. These are programs for mentally and physically exceptional pupils, the home and hospital bound, social adjustment centers, pre-kindergarten centers, continuation centers for dropouts, and vocational apprenticeship centers. Pupils who take an occasional class such as remedial reading, advanced college placement class in English are not counted.

The distribution of pupils into these four categories are shown for eleven cities in Table 1. Considerable thought was given to a further count of all pupils in high schools into instructional fields as was done in the sample of 26 high schools in the second project. However, a breakdown of this type did not appear to be feasible with present methods of pupil accounting. Such counting may be feasible after data processing systems are developed.

Step 2: Distribution of Teachers. This step allocates the time of teachers for instruction of pupils as counted in Table 1. The distribution of staff time in full-time equivalents is shown in Table 2. For example, in these eleven cities 8.0 per cent of teachers' time in the elementary schools is devoted to 3.5 per cent of the pupils who are classified in special programs by the definition of this study. In the high schools 5.8 per cent of teachers' time is devoted to 4.0 per cent of the pupils in special programs.

Pupil-teacher ratios of these four groups of students are shown in Table 3. In the regular elementary school programs there is an average of 30.2 pupils per teacher. The ratio is 12.6 for special programs in these schools.

TABLE 1

DISTRIBUTION OF PUPILS

1962-1963

City	Number of Pupils in Elementary Grades				Number of Pupils in Junior and Senior High Schools				Grand Total
	Total (1)	Regular Programs (2)	Special Programs (3)	Percent Special is of Regular (4)	Total (5)	Regular Programs (6)	Special Programs (7)	Percent Special is of Regular (8)	(9)
1. Baltimore	103,098	97,090	6,008	6.2%	68,976	63,421	5,555	8.8%	172,074
2. Boston	51,048	49,109	1,939	4.0	38,492	36,183	2,309	6.4	89,540
3. Buffalo	--	--	--	--	--	--	--	--	--
4. Chicago	368,542	358,848	9,694	2.7	115,559	113,120	2,479	2.2	484,141
5. Cleveland	83,982	81,387	2,595	3.2	52,706	52,162	544	1.0	136,688
6. Detroit	175,621	167,609	8,012	4.8	101,453	98,221	3,232	3.3	277,074
7. Houston	122,203	120,892	1,311	1.1	69,138	68,227	911	1.3	191,341
8. Los Angeles	313,172	300,655	12,517	4.2	226,489	221,682	4,807	2.2	539,661
9. Milwaukee	63,773	62,265	1,508	2.4	40,607	39,733	874	2.2	104,380
10. New York	541,066	531,363	9,703	1.8	461,295	435,825	25,470	5.8	1,002,361
11. Philadelphia	136,954	132,115	4,839	3.7	117,662	112,067	5,595	5.0	254,616
12. Pittsburgh	43,512	42,053	1,459	3.5	28,266	27,700	566	2.0	71,778
13. St. Louis	--	--	--	--	--	--	--	--	--
Average				3.5%				4.0%	

Note: Pupils are counted in full-time equivalents.

TABLE 2

DISTRIBUTION OF TEACHERS

1962-1963

City	Number of Teachers in Elementary Grades				Number of Teachers in Junior and Senior High Schools				Grand Total
	Total (1)	Regular Programs (2)	Special Programs (3)	Percent Special is of Regular (4)	Total (5)	Regular Programs (6)	Special Programs (7)	Percent Special is of Regular (8)	(9)
1. Baltimore	3,413	3,108	305	9.8%	2,870	2,609	261	10.0%	6,283
2. Boston	1,964	1,818	146	8.0	1,637	1,437	200	13.9	3,601
3. Buffalo	--	--	--	--	--	--	--	--	--
4. Chicago	12,729	11,911	818	6.9	4,885	4,690	195	4.2	17,614
5. Cleveland	2,812	2,627	185	7.0	2,106	2,062	44	2.1	4,918
6. Detroit	5,789	5,212	577	11.0	4,367	4,123	244	5.9	10,156
7. Houston	4,321	4,117	204	5.0	3,200	3,109	91	2.9	7,521
8. Los Angeles	10,300	9,414	886	9.4	9,455	9,194	261	2.8	19,755
9. Milwaukee	2,356	2,146	210	9.8	1,748	1,660	88	5.3	4,104
10. New York	21,188	20,231	957	4.5	21,195	19,858	1,337	6.7	42,383
11. Philadelphia	4,405	4,086	319	7.8	4,629	4,258	371	8.7	9,034
12. Pittsburgh	1,444	1,333	111	8.3	1,083	1,044	39	3.7	2,527
13. St. Louis	--	--	--	--	--	--	--	--	--
Average				8.0%				5.8%	

TABLE 3

PUPIL-TEACHER RATIOS

1962-1963

City	Elementary Schools			Junior and Senior High Schools		
	Regular Programs (1)	Special Programs (2)	Total (3)	Regular Programs (4)	Special Programs (5)	Total (6)
1. Baltimore	31.2	19.7	30.2	24.3	21.3	24.0
2. Boston	27.0	13.3	26.0	25.2	11.5	23.5
3. Buffalo	--	--	--	--	--	--
4. Chicago	30.0	11.6	29.0	24.1	12.7	23.7
5. Cleveland	31.0	14.0	29.9	25.3	12.4	25.0
6. Detroit	32.0	13.9	30.3	23.8	13.2	23.2
7. Houston	29.4	6.4	28.3	21.9	10.0	21.6
8. Los Angeles	31.9	14.1	30.4	24.1	18.4	24.0
9. Milwaukee	29.0	7.2	27.1	23.9	9.9	23.2
10. New York	26.3	10.1	25.5	21.9	19.1	21.8
11. Philadelphia	32.3	15.2	31.1	26.3	15.1	25.4
12. Pittsburgh	31.5	13.1	30.1	26.5	14.5	26.1
13. St. Louis	--	--	--	--	--	--
Average	30.2	12.6	28.9	24.3	14.4	23.8

In the high schools the average ratio for the regular programs is 24.3 and for the special programs 14.4.

Step 3: Basic Cost Units. In this step the average cost (expenditure) per pupil for teachers' salaries is calculated for each of the four programs. In the regular programs of the elementary schools, for example, the average cost per pupil ranges from $185 in Houston to $297 in New York. The average of the eleven cities is $250.

Two factors account for these differences. One of them is the average salary paid teachers in the respective programs and the other is the average pupil-teacher ratio. Each of these factors is a result of policies which are determined by a number of conditions, including the amount of available financial resources.

These same factors of salaries and pupil-teacher ratios determine the variations in average per pupil expenditures among the four classifications of programs shown in Table 4. For example, the average cost per pupil for teachers' salaries in the special programs of the elementary schools in the eleven cities is $617. The ratio of this cost to the average for pupils in the regular programs is 2.4694. In other words for every dollar spent on each pupil in the regular programs of the elementary schools for teachers' salaries an average of $2.47 is spent on each pupil for whom a full-time special program is provided.

Carrying forward the comparison of average per pupil costs by programs, it is observed that the average expenditure per pupil in the regular programs of high schools is $323. This figure is 1.2903 times greater than the average of $250 for the regular programs in the elementary schools. The average for the special high school programs is $462 or 1.8461 times the average of the regular programs in elementary schools.

TABLE 4

BASIC COST UNITS

(Average Expenditure per Pupil for Salaries of Teachers)

1962-1963

City	Elementary Schools			Junior and Senior High Schools			
	Regular Programs (2)	Special Programs (3)	Ratio* 1 Col. 3 - Col. 2 (4)	Regular Programs (5)	Special Programs (6)	Ratio* 2 Col. 5 - Col. 2 (7)	Ratio* 3 Col. 6 - Col. 2 (8)
1. Baltimore	$189	$300	1.5858	$262	$300	1.3885	1.5859
2. Boston	252	414	1.6429	283	343	1.1226	1.3588
3. Buffalo	--	--	--	--	--	--	--
4. Chicago	237	615	2.5907	303	659	1.2780	2.7778
5. Cleveland	202	463	2.2888	258	602	1.2745	2.9745
6. Detroit	238	483	2.0259	295	570	1.2372	2.3921
7. Houston	185	1,108	5.9952	272	484	1.4728	2.6209
8. Los Angeles	237	535	2.2606	332	435	1.4044	1.8386
9. Milwaukee	232	840	3.6151	297	781	1.2775	3.3587
10. New York	297	826	2.7839	374	458	1.2591	1.5448
11. Philadelphia	236	738	3.1272	277	580	1.1718	2.4566
12. Pittsburgh	213	495	2.3190	251	449	1.1766	2.1068
13. St. Louis	--	--	--	--	--	--	--
Weighted Average (Obtained by combining totals of all cities)	250	617	2.4694	323	462	1.2903	1.8461

* Average expenditure per elementary pupil (K-6 FTE) in regular program = 1.00.

Table 4 shows the information which is used in this study to lay the foundations of the structure of educational costs. The basic unit or module of operating costs is the average expenditure per pupil for teachers' salaries in the regular programs of the elementary schools. This unit has a simple and rational explanation. Salaries of teachers can be justified in terms of a number of factors such as professional training, length of service, living costs, and occupational contribution to society. The average pupil-teacher ratio on which the task of instruction is organized can be evaluated. Thus, this unit of cost is used as a standard for weighting the average per pupil costs in other defined programs.

The total number of basic weighted pupil units of costs for all teachers' salaries in each of the eleven city school systems is computed by applying the ratios of average per pupil costs shown in Table 4 to the number of pupils in the respective programs. The results of these weightings are shown in Table 5. For example, in 1962-1963 Baltimore had 97,090 pupils in regular programs in the elementary schools. These are counted as 97,090 weighted pupil units, or at the ratio of 1.0. The number of actual pupils in special elementary school programs is weighted at the ratio of 1.5858 (shown in Table 4), giving a total of 9,528 weighted pupil units for these programs. The ratio of 1.3885 is applied to the actual number of pupils in regular high school programs and 1.5859 is applied to the number in special high school programs. This procedure gives a total of 203,493 weighted pupil cost units at an average of $189 each for payments of salaries to all teachers in this city. This procedure is used to compute the total number of basic cost units in the eleven cities. Thus step 3 presents the four basic or foundation components of the structure of operating costs.

TABLE 5

STRUCTURE OF COSTS FOR EXPENSES OF CURRENT OPERATION
(Basic Weighted Pupil Cost Units* in Teachers' Salaries)
1962-1963

Budgetary Component (1)	Baltimore		Boston		Chicago	
	Number (2)	Percent of Basic Component (3)	Number (4)	Percent of Basic Component (5)	Number (6)	Percent of Basic Component (7)
1. Number of pupils in Regular El. Programs	97,090	47.7%	49,109	51.1%	358,848	66.1%
2. Number of pupils in Special El. Programs times ratio 1	9,528	4.7	3,186	3.3	25,115	4.7
3. Number of pupils in Regular H. S. Programs times ratio 2	88,065	43.3	40,619	42.3	144,572	27.0
4. Number of pupils in Special H. S. Programs times ratio 3	8,810	4.3	3,138	3.3	6,886	1.3
5. Total number of Basic Weighted Pupil Units	203,493	100.0	96,052	100.0	535,421	100.0

* Average expenditure per elementary pupil (K-6 FTE) in Regular programs for salaries of classroom teachers in regular programs equals one weighted pupil unit.

TABLE 5 (Continued)

Budgetary Component (1)	Cleveland		Detroit		Houston	
	Number (8)	Percent of Basic Component (9)	Number (10)	Percent of Basic Component (11)	Number (12)	Percent of Basic Component (13)
1. Number of pupils in Regular El. Programs	81,387	52.4%	167,609	53.5%	120,892	52.2%
2. Number of pupils in Special El. Programs times ratio 1	5,440	3.8	16,232	5.2	7,860	3.4
3. Number of pupils in Regular H. S. Programs times ratio 2	66,485	42.8	121,520	38.8	100,490	43.4
4. Number of pupils in Special H. S. Programs times ratio 3	1,618	1.0	7,731	2.5	2,388	1.0
5. Total number of Basic Weighted Pupil Units	155,429	100.0	313,092	100.0	231,630	100.0

TABLE 5 (Continued)

Budgetary Component (1)	Los Angeles		Milwaukee		New York	
	Number (14)	Percent of Basic Component (15)	Number (16)	Percent of Basic Component (17)	Number (18)	Percent of Basic Component (19)
1. Number of pupils in Regular El. Programs	300,655	46.3%	62,265	51.3%	531,363	46.3%
2. Number of pupils in Special El. Programs times ratio 1	28,296	4.4	5,452	4.5	27,013	2.4
3. Number of pupils in Regular H. S. Programs times ratio 2	311,339	48.0	50,761	41.8	548,778	47.9
4. Number of pupils in Special H. S. Programs times ratio 3	8,838	1.3	2,936	2.4	39,347	3.4
5. Total number of Basic Weighted Pupil Units	649,128	100.0	121,414	100.0	1,146,501	100.0

TABLE 5 (Continued)

Budgetary Component (1)	Philadelphia Number (20)	Philadelphia Percent of Basic Component (21)	Pittsburgh Number (22)	Pittsburgh Percent of Basic Component (23)
1. Number of pupils in Regular El. Programs	132,115	45.2%	42,053	53.1%
2. Number of pupils in Special El. Programs times ratio 1	15,133	5.2	3,384	4.3
3. Number of pupils in Regular H. S. Programs times ratio 2	131,326	44.9	32,593	41.1
4. Number of pupils in Special H. S. Programs times ratio 3	13,745	4.7	1,191	1.5
5. Total number of Basic Weighted Pupil Units	292,319	100.0	79,221	100.0

Step 4: Equivalent Weighted Pupil Units for Operating Expenses other than Teachers' Salaries. This step completes the development of the cost structure in this study. There are eleven cost components for operating expenses, four basic ones to express the amounts of expenditures for salaries of teachers, and seven for other expenses. These additional components are for the purposes of extension, reinforcement, and support of the teaching function. The librarian and the counselor at times may merely extend the work of the teacher in specialized ways. At other times their services may reinforce the performance of the teacher. The administrator gives leadership which contributes to individual and collective performance. The custodian also performs a service which helps the teacher to utilize his professional talents more efficiently.

The seven cost components in addition to the basic ones for teachers' salaries are as follows:

1. Salaries of non-teaching professional staff members on the job.
2. Salaries of professional staff members on leave of absence.
3. Salaries and other expenses for community services.
4. Retirement payments for professional and non-professional staff members.
5. Other operating expenses of day schools in regular academic year.
6. All operating expenses of adult evening programs.
7. All operating expenses of summer school.

The amount of current operating expenditure in each of these components is converted into weighted pupil units equivalent to the respective basic pupil unit expenditure for teachers' salaries. The computations are shown in Table 6. For example, in Baltimore in 1962-1963 the total salary payments for non-teaching professional service amount to 43,422 weighted pupil units at the unit rate of $189 each.

TABLE 6

STRUCTURE OF COSTS FOR EXPENSES OF CURRENT OPERATION

(Equivalent Weighted Pupil Cost Units* --
Operating Expenses other than Teachers' Salaries)

1962-1963

Budgetary Component (1)	Baltimore		Boston	
	Number (2)	Percent of Basic Component (3)	Number (4)	Percent of Basic Component (5)
1. No. of weighted pupil equivalencies in salaries of non-teaching prof. staff on the job	43,422	21.3%	8,571	8.9%
2. No. of weighted pupil equivalencies in Community Services	0	0	1,084	1.1
3. No. of weighted pupil equivalencies in salaries of staff on leave of absence	3,564	1.8	1,696	1.8
4. No. of weighted pupil equivalencies in retirement payments (Prof. and Non-Prof.)	25,755	12.7	18,419	19.1
5. No. of weighted pupil equivalencies in other current expenses	89,568	44.0	38,505	40.1
6. No. of weighted pupil equivalencies in adult evening programs	2,722	1.3	768	.8
7. No. of weighted pupil equivalencies in summer school	542	.3	347	.4
8. Total number of weighted pupil units equivalent to average expenditure per elementary pupil in regular programs for teachers' salaries	369,066	181.4	165,442	172.2
9. Average expenditure per elementary pupil in regular programs for teachers' salaries	$189		$252	
10. Total weighted operating budget (#8 x #9)	$69,742,402		$41,721,164	
11. Actual Budget	$69,742,805		$41,720,942	

* Average expenditure per elementary pupil (K-6 FTE) in regular programs for

Table 6 (Continued)

Budgetary Component (1)	Chicago Number (6)	Chicago Percent of Basic Component (7)	Cleveland Number (8)	Cleveland Percent of Basic Component (9)
1. No. of weighted pupil equivalencies in salaries of non-teaching prof. staff on the job	106,790	19.9%	23,244	15.0%
2. No. of weighted pupil equivalencies in Community Services	22,883	4.3	2,551	1.6
3. No. of weighted pupil equivalencies in salaries of staff on leave of absence	18,896	3.5	2,859	1.8
4. No. of weighted pupil equivalencies in retirement payments (Prof. and Non-Prof.)	74,394	13.9**	25,068	16.1
5. No. of weighted pupil equivalencies in other current expenses	240,003	44.8	80,001	51.5
6. No. of weighted pupil equivalencies in adult evening programs	8,103	1.5	2,100	1.4
7. No. of weighted pupil equivalencies in summer school	11,395	2.2	1,393	.9
8. Total number of weighted pupil units equivalent to average expenditure per elementary pupil in regular programs for teachers' salaries	1,017,885	190.1	292,645	188.3
9. Average expenditure per elementary pupil in regular programs for teachers' salaries	$237		$202	
10. Total weighted operating budget (#8 x #9)	$241,601,112		$59,193,304	
11. Actual Budget	$241,601,313		$59,193,361	

** Includes $3,066,720 (2.4 per cent) paid by municipal government for civil service (non-prof.) employees of the public schools.

Table 6 (Continued)

Budgetary Component (1)	Detroit Number (10)	Detroit Percent of Basic Component (11)	Houston Number (12)	Houston Percent of Basic Component (13)
1. No. of weighted pupil equivalencies in salaries of non-teaching prof. staff on the job	44,816	14.3%	31,182	13.5%
2. No. of weighted pupil equivalencies in Community Services	551	.2	239	.1
3. No. of weighted pupil equivalencies in salaries of staff on leave of absence	9,663	3.0	3,252	1.4
4. No. of weighted pupil equivalencies in retirement payments (Prof. and Non-Prof.)	24,094	7.7	28,148	12.1**
5. No. of weighted pupil equivalencies in other current expenses	134,603	43.0	60,031	25.9
6. No. of weighted pupil equivalencies in adult evening programs	4,303	1.4	626	.3
7. No. of weighted pupil equivalencies in summer school	2,729	.9	3,610	1.6
8. Total number of weighted pupil units equivalent to average expenditure per elementary pupil in regular programs for teachers' salaries	533,851	170.5	358,718	154.9
9. Average expenditure per elementary pupil in regular programs for teachers' salaries	$238		$185	
10. Total weighted operating budget (#8 x #9)	$127,230,573		$66,276,738	
11. Actual Budget	$127,230,543		$66,276,802	

** Estimated

Table 6 (Continued)

Budgetary Component (1)	Los Angeles Number (14)	Los Angeles Percent of Basic Component (15)	Milwaukee Number (16)	Milwaukee Percent of Basic Component (17)
1. No. of weighted pupil equivalencies in salaries of non-teaching prof. staff on the job	97,890	15.1%	14,256	11.7%
2. No. of weighted pupil equivalencies in Community Services	16,650	2.6	14,209	11.7
3. No. of weighted pupil equivalencies in salaries of staff on leave of absence	2,847	.4	--	--
4. No. of weighted pupil equivalencies in retirement payments (Prof. and Non-Prof.)	56,777	8.7	16,492	13.6**
5. No. of weighted pupil equivalencies in other current expenses	313,173	48.4	67,965	56.0
6. No. of weighted pupil equivalencies in adult evening programs	16,044	2.5	645	.5
7. No. of weighted pupil equivalencies in summer school	11,182	1.7	1,560	1.3
8. Total number of weighted pupil units equivalent to average expenditure per elementary pupil in regular programs for teachers' salaries	1,163,691	179.3	236,541	194.8
9. Average expenditure per elementary pupil in regular programs for teachers' salaries	$237		$232	
10. Total weighted operating budget (#8 x #9)	$275,457,297		$54,967,398	
11. Actual Budget	$275,457,521		$54,967,674	

** Estimated

Table 6 (Continued)

Budgetary Component (1)	New York		Philadelphia	
	Number (18)	Percent of Basic Component (19)	Number (20)	Percent of Basic Component (21)
1. No. of weighted pupil equivalencies in salaries of non-teaching prof. staff on the job	191,041	16.7%	28,638	9.8%
2. No. of weighted pupil equivalencies in Community Services	29,814	2.6	11,060	3.8
3. No. of weighted pupil equivalencies in salaries of staff on leave of absence	--	--	--	--
4. No. of weighted pupil equivalencies in retirement payments (Prof. and Non-Prof.)	318,013	27.7	24,110	8.2
5. No. of weighted pupil equivalencies in other current expenses	827,873	72.2	169,473	58.0
6. No. of weighted pupil equivalencies in adult evening programs	14,353	1.3	7,182	2.4
7. No. of weighted pupil equivalencies in summer school	4,638	.4	2,869	1.0
8. Total number of weighted pupil units equivalent to average expenditure per elementary pupil in regular programs for teachers' salaries	2,532,233	220.9	535,651	183.2
9. Average expenditure per elementary pupil in regular programs for teachers' salaries	$297		$236	
10. Total weighted operating budget (#8 x #9)	$751,440,143		$126,392,210	
11. Actual Budget	$751,439,768		$126,393,238	

Budgetary Component	Number (14)	Percent of Basic Component (15)	Number (16)	Percent of Basic Component (17)
1. No. of weighted pupil equivalencies in salaries of non-teaching prof. staff on the job	97,890	15.1%	14,256	11.7%
2. No. of weighted pupil equivalencies in Community Services	16,650	2.6	14,209	11.7
3. No. of weighted pupil equivalencies in salaries of staff on leave of absence	2,847	.4	--	--
4. No. of weighted pupil equivalencies in retirement payments (Prof. and Non-Prof.)	56,777	8.7	16,492	13.6**
5. No. of weighted pupil equivalencies in other current expenses	313,173	48.4	67,965	56.0
6. No. of weighted pupil equivalencies in adult evening programs	16,044	2.5	645	.5
7. No. of weighted pupil equivalencies in summer school	11,182	1.7	1,560	1.3
8. Total number of weighted pupil units equivalent to average expenditure per elementary pupil in regular programs for teachers' salaries	1,163,691	179.3	236,541	194.8
9. Average expenditure per elementary pupil in regular programs for teachers' salaries	$237		$232	
10. Total weighted operating budget (#8 x #9)	$275,457,297		$54,967,398	
11. Actual Budget	$275,457,521		$54,967,674	

** Estimated

Table 6 (Continued)

Budgetary Component (1)	Pittsburgh Number (22)	Pittsburgh Percent of Basic Component (23)
1. No. of weighted pupil equivalencies in salaries of non-teaching prof. staff on the job	15,776	19.9%
2. No. of weighted pupil equivalencies in Community Services	404	.5
3. No. of weighted pupil equivalencies in salaries of staff on leave of absence	1,191	1.5
4. No. of weighted pupil equivalencies in retirement payments (Prof. and Non-Prof.)	8,963	11.3
5. No. of weighted pupil equivalencies in other current expenses	41,807	52.8
6. No. of weighted pupil equivalencies in adult evening programs	754	1.0
7. No. of weighted pupil equivalencies in summer school	555	.7
8. Total number of weighted pupil units equivalent to average expenditure per elementary pupil in regular programs for teachers' salaries	148,671	187.7
9. Average expenditure per elementary pupil in regular programs for teachers' salaries	$213	
10. Total weighted operating budget (#8 x #9)	$31,711,524	
11. Actual Budget	$31,711,454	

The amounts of current expense in the other components are converted likewise, giving a grand total of 369,066 weighted pupil units for all eleven components as defined in this study.

The percentage distributions of the cost components are shown also in Tables 5 and 6. Each component is computed as a percentage of the total number of basic units for teachers' salaries. Thus, again in the case of Baltimore, the total number of weighted pupil units is 181.4 per cent of the number of basic pupil units for salaries of teachers. Expressed another way the total operating budget of this system in 1962-1963 is 181.4 per cent of salary payments to teachers. In other words the amount of expense for direct payments of salaries to teachers is increased by 81.4 per cent for other expenses.

Summary: Structure of Operating Costs

The structure of costs for the eleven cities treated as one group is shown in Tables 7 and 8. The distribution of the eleven components is a weighted average of the group. The average cost per pupil in regular programs in all elementary schools of the eleven cities is $250 (rounded) for salaries of teachers in these programs. Teachers in these programs receive 50.83 per cent of all salaries paid for the function of teaching. The teachers in the regular high school programs receive 42.80 per cent of all teachers' salaries, while those in special programs in both type of schools receive 6.37 per cent.

The salaries of non-teaching professional staff members amount to 15.84 per cent of all teachers' salaries. This component includes such professional functions as administration and supervision, guidance and counseling, research, psychological services, and library services. An effort was made to allocate these various functions to the respective program components but information was not available in suitable form for such a detailed breakdown.

TABLE 7

STRUCTURE OF COSTS FOR EXPENSES OF CURRENT OPERATION

Summary of

Total Basic Pupil Cost Units of Eleven Great Cities

1962-1963

Budgetary Component	Number of Pupils Actual	Number of Weighted Pupil Units*	Ratio (Regular El. pupil = 1.0)	Percent of Basic Component
1. Number of pupils in regular elementary programs	1,943,386	1,943,386	1.0000	50.83%
2. Number of pupils in special elementary programs	59,585	147,138	2.4694	3.85
3. Number of pupils in regular high school programs	1,268,341	1,636,548	1.2903	42.80
4. Number of pupils in special high school programs	52,342	96,628	1.8461	2.52
5. Total number of basic weighted pupil units	3,323,654	3,823,700	1.1505	100.00

* Average expenditure per elementary pupil (K-6 FTE) in regular programs for salaries of classroom teachers in regular programs equals one weighted pupil unit. In the year 1962-1963 the average expenditure per weighted pupil unit in this group of cities taken as a whole was $250.

TABLE 8

STRUCTURE OF COSTS FOR EXPENSES OF CURRENT OPERATION
Summary of Total Equivalent Weighted Pupil Cost Units
for Operating Expenses in Eleven Great Cities
1962-1963

Budgetary Component	Number of Equivalent Weighted Pupil Units	Percent of Total Basic Weighted Pupil Cost Units
1. Number of basic weighted pupil cost units for salaries of classroom teachers in programs of day schools in academic (9-10 mo.) year	3,823,700	100.00%
2. Number of additional weighted pupil equivalencies for:		
(1) Salaries of non-teaching professional staff on the job	605,626	15.84
(2) Salaries of professional staff on leave of absence	43,968	1.15
(3) Salaries and other expenses for Community Services	99,445	2.60
(4) Retirement payments of professional and non-professional staff	620,233	16.22
(5) Other operating expenses of day schools in regular academic year	2,063,002	53.95
(6) All operating expenses of adult evening programs	57,600	1.50
(7) All operating expenses of summer school	40,820	1.07
(8) Total number of additional weighted pupil equivalencies	3,530,694	92.33
3. Grand total number of weighted pupil cost units	7,354,394	192.33
4. Average expenditure per weighted pupil unit	$250	
5. Total of operating budgets	$1,845,735,421	

Only 1.15 per cent of teachers' salaries is spent for leaves of absence, including leave for illness and other emergencies plus leave for in-service education. If the principle of leave of absence for in-service education is taken seriously, this component would increase many times.

These systems add 2.60 per cent of teachers' salaries for community services. These activities include such things as operation of neighborhood playgrounds, provision for security of school plants and personnel, staff time for community planning and other services.

Retirement payments to professional and non-professional staffs add an expense equal to 16.22 per cent of teachers' salaries.

Another amount equivalent to 53.95 per cent is added for other expenses of current operations of day schools for the academic (9-10 months) year. These expenses include such items as instructional materials, salaries of all non-professional or non-certificated personnel, maintenance of buildings, transportation, and fixed charges.

Adult evening programs and summer schools add the equivalent of 2.57 per cent of teachers' salaries.

Seven components of operating costs of these eleven systems for the 12-months' fiscal period of 1962-1963 add an amount equivalent to 92.33 per cent of the salaries of teachers for the school year.

Costs of Capital Outlay

Nobody has ever found a functional relationship between operating and capital costs of education that can be applied satisfactorily on an annual fiscal basis. Over thirty years ago Grossnickle[3] estimated that capital costs

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[3] Grossnickle, Foster E. Capital Outlay in Relation to a State's Minimum Program, New York: Bureau of Publications, Teachers College, Columbia University, 1931.

would average out over the years at the annual rate of 14 per cent of the current operating budget. His estimate was based on the assumption that changes in the price structure due to inflation and other causes would have an equal effect on both of these costs.

The writer's observations on capital costs from time to time over the past fifteen years indicate that the figure of 14 per cent is a little low. There appears to be a wide variation in the long run proportion of these two expenses among school districts. In communities of high cost of school plants the figure is close to 20 per cent if financing is done through bonded indebtedness.

At best this type of estimate is very gross. Its chief value is for long-term estimation on a state and national basis and not for projection in a local district. At the local level the variable problems associated with growth rate of school population, accumulated backlogs of capital needs, rate of increasing obsolescence of old buildings due to changes in educational programs call for methods to manage capital needs on a short-cycle or emergency basis rather than on a long-term basis.

The costs of capital outlay should be inventoried and analyzed on a continuous basis. Each state should be collecting information on capital expenditures each year in such form as to permit an evaluation of trends. If this were done for various types of school systems, cost analyses could advance the knowledge about capital costs, particularly in relation to operating expenses.

In the absence of such general information the writer has attempted to design a structure which might be useful in the improvement of financing capital needs. The study is limited to new buildings which were constructed in the three-year period of 1961-1963.

Renovations and additions to existing plants are excluded from consideration at this time. These costs require estimation by micro-analysis or detailed survey of each school plant. Only through the procedure of adding the estimate for each school in the system could the total needs be determined. Such a procedure has marked limitations, as contrasted with estimates for new buildings from normative data. The first one is the difficulty in setting criteria that are applicable generally to a given school population. Every building has to be surveyed and classified as to potential renovation. If a building is renovatable there is a narrow range of alternatives for change due to the inherent rigidities in the existing structure. Thus the planner has less freedom to relate space and facilities to educational function than he does when he designs a new building. Much of what he does is to perpetuate deficiencies or a lower level of efficiency than he can accomplish through original planning of new plants.

Again the principle of function is the underlying criterion. Changes in needs of society produce changes in educational programs and services and these in turn require changes in capital needs. In the end the costs of school plants and facilities are affected. Moreover, the costs of new plants are affected not only by present needs but also by anticipations of the future. What might appear to be an extra cost of a building today would be an economy five or ten years hence.

In this analysis school plants are divided into three types: (1) elementary schools, (2) junior high schools, and (3) senior high schools. Each type is divided further into three categories of size. Two kinds of information are shown for each size and type of school plant: (1) distribution of building space in relation to number of pupils served, and (2) distribution of cost components.

The distributions of space and costs are summarized in Tables 9 through 14. Breakdowns for each city are shown in the appendix. The summaries indicate the central tendencies in the amount and distribution of space and in costs, though the sample is not as complete as desired to satisfy the principle of representativeness. If this design seems to be useful, districts may establish procedures for regular collection of such data.

These distributions of cost and space indicate the following possibilities of significance in estimating needs of capital outlay:

1. The distribution and amounts of space differ among types of schools.
2. There is some variation in distribution of space among different sizes of schools of the same type.
3. Small schools cost more per pupil than large ones.
4. The per pupil costs of junior high schools are larger than those of elementary schools. The per pupil costs of senior high schools are larger than those of junior high schools.
5. The total costs of schools range from about 110 to 143 per cent of the basic costs of buildings and furnishings. Most of the extra expense is due to cost of site and site development.

TABLE 9

DISTRIBUTION OF BUILDING SPACE

ELEMENTARY SCHOOLS
(Constructed 1961-1963)

Type of Space	Average of 7 Schools — Under 500 Pupils			Average of 25 Schools — 500 - 999 Pupils			Average of 24 Schools — 1000 - 1499 Pupils		
	Amount of Space: sq.ft.	Percent*	Amount per Pupil: sq.ft.	Amount of Space: sq.ft.	Percent*	Amount per Pupil: sq.ft.	Amount of Space: sq.ft.	Percent*	Amount per Pupil: sq.ft.
1. Classroom and Laboratory	8,406	100.0%	20.9	18,904	100.0%	24.0	28,307	100.0%	24.1
a. Classroom space	6,950	82.7	17.3	16,288	86.2	20.7	27,268	96.3	23.2
b. Laboratory space	1,456	17.3	3.6	2,616	13.8	3.3	1,039	3.7	0.9
2. Special Services**	362	4.3	0.9	578	3.1	0.7	1,641	5.8	1.4
3. Library	420	5.0	1.1	877	4.6	1.1	600	2.1	0.5
4. Staff Offices	498	5.9	1.2	942	5.0	1.2	1,321	4.7	1.1
5. Large Mass Activity	3,358	40.0	8.3	5,697	30.1	7.2	9,102	32.2	7.7
a. Cafeteria	971	11.6	2.4	2,771	14.7	3.5	3,128	11.1	2.6
b. Auditorium	336	4.0	0.8	1,441	7.6	1.8	2,084	7.4	1.8
c. Gymnasium	2,051	24.4	5.1	1,485	7.8	1.9	3,890	13.7	3.3
6. Total building space exclusive of general utility (corridors, lounges, heating, storage, etc.)	13,044	155.2	32.4	26,998	142.8	34.2	40,971	144.8	34.8

* Percent of space for classrooms and laboratories.
** Health, guidance, counseling, etc.

TABLE 10

DISTRIBUTION OF CAPITAL COSTS

ELEMENTARY SCHOOLS
(Constructed 1961-1963)

Components of Cost	Average of 9 Schools Under 500 Pupils			Average of 30 Schools 500 - 999 Pupils			Average of 28 Schools 1000 - 1499 Pupils		
	Total Cost ($000)	Percent*	Cost per Pupil	Total Cost ($000)	Percent*	Cost per Pupil	Total Cost ($000)	Percent*	Cost per Pupil
Total Cost of Plant	$ 577	143.3%	$1,560	$ 943	126.4%	$1,202	$1,370	126.3%	$1,167
1. Site and Site Development	147	36.4	397	156	20.9	199	239	22.1	204
a. Land	122	30.3	330	125	16.8	159	228	21.0	194
b. Demolition	5	1.2	14	6	0.8	8	4	0.4	4
c. Landscaping	20	4.9	53	25	3.3	32	7	0.7	6
2. Building and Furnishings	402	100.0	1,088	746	100.0	951	1,085	100.0	924
a. Construction and utilities	381	94.7	1,030	701	94.0	894	1,050	96.7	894
b. Furnishings for instruction	21	5.3	58	45	6.0	57	35	3.3	30
3. Administrative Costs	28	6.9	75	41	5.5	52	46	4.2	39
a. Architectural fees	21	5.3	57	37	5.0	47	40	3.7	34
b. Legal and others	7	1.6	18	4	0.5	5	6	0.5	5

* Percent of cost of building and furnishings.

TABLE 11

DISTRIBUTION OF BUILDING SPACE

JUNIOR HIGH SCHOOLS
(Constructed 1961-1963)

Type of Space	Average of 5 Schools 500 - 999 Pupils			Average of 4 Schools 1000 - 1499 Pupils			Average of 7 Schools 1500 - 2499 Pupils		
	Amount of Space: sq.ft.	Percent*	Amount per Pupil: sq.ft.	Amount of Space: sq.ft.	Percent*	Amount per Pupil: sq.ft.	Amount of Space: sq.ft.	Percent*	Amount per Pupil: sq.ft.
1. Classroom and Laboratory	28,497	100.0%	34.7	42,834	100.0%	35.7	62,799	100.0%	33.2
a. Classroom space	11,078	38.9	13.5	19,577	45.7	16.3	30,359	48.3	16.0
b. Laboratory space	17,419	61.1	21.2	23,257	54.3	19.4	32,440	51.7	17.2
2. Special Services**	1,334	4.7	1.6	2,093	4.9	1.7	2,439	3.9	1.3
3. Library	2,255	7.9	2.7	2,405	5.6	2.0	2,905	4.6	1.5
4. Staff Offices	2,000	7.0	2.4	2,401	5.6	2.0	4,459	7.1	2.4
5. Large Mass Activity	20,169	70.7	24.6	24,873	58.1	20.8	29,403	46.8	15.6
a. Cafeteria	9,132	32.0	11.1	9,345	21.8	7.8	8,892	14.1	4.7
b. Auditorium	1,768	6.2	2.2	4,177	9.8	3.5	8,987	14.3	4.8
c. Gymnasium	9,269	32.5	11.3	11,351	26.5	9.5	11,524	18.4	6.1
6. Total building space exclusive of general utility (corridors, lounges, heating, storage, etc.)	54,255	190.3	66.0	74,606	174.2	62.2	102,005	162.4	54.0

* Percent of space for classrooms and laboratories.
** Health, guidance, counseling, etc.

TABLE 12

DISTRIBUTION OF CAPITAL COSTS

JUNIOR HIGH SCHOOLS
(Constructed 1961-1963)

Components of Cost	Average of 5 Schools 500 - 999 Pupils			Average of 4 Schools 1000 - 1499 Pupils			Average of 7 Schools 1500 - 2499 Pupils		
	Total Cost ($000)	Percent*	Cost per Pupil	Total Cost ($000)	Percent*	Cost per Pupil	Total Cost ($000)	Percent*	Cost per Pupil
Total Cost of Plant	$1,898	140.1%	$2,308	$2,556	109.2%	$2,130	$3,652	117.6%	$1,933
1. Site and Site Development	448	33.1	545	125	5.3	104	409	13.2	217
a. Land	358	26.5	436	72	3.1	60	336	10.8	178
b. Demolition	14	1.0	17	0	0.0	0	0	0.0	0
c. Landscaping	76	5.6	92	53	2.2	44	73	2.4	39
2. Building and Furnishings	1,354	100.0	1,647	2,341	100.0	1,951	3,106	100.0	1,644
a. Construction and utilities	1,254	92.6	1,525	2,173	92.8	1,811	2,823	90.9	1,494
b. Furnishings for instruction	100	7.4	122	168	7.2	140	283	9.1	150
3. Administrative Costs	96	7.0	116	90	3.9	75	137	4.4	72
a. Architectural fees	73	5.3	89	79	3.4	66	123	3.9	65
b. Legal and others	23	1.7	27	11	0.5	9	14	0.5	7

* Percent of cost of building and furnishings.

TABLE 13

DISTRIBUTION OF BUILDING SPACE

SENIOR HIGH SCHOOLS
(Constructed 1961-1963)

Type of Space	Average of 2 Schools 1000 - 1499 Pupils			Average of 5 Schools** 1500 - 2499 Pupils			Average of 6 Schools Above 2500 Pupils		
	Amount of Space: sq.ft.	Percent*	Amount per Pupil: sq.ft.	Amount of Space: sq.ft.	Percent*	Amount per Pupil: sq.ft.	Amount of Space: sq.ft.	Percent*	Amount per Pupil: sq.ft.
1. Classroom and Laboratory	46,196	100.0%	35.7	55,048	100.0%	30.8	95,771	100.0%	32.1
a. Classroom space	13,159	28.5	10.2	26,872	48.8	15.0	38,886	40.6	13.0
b. Laboratory space	33,037	71.5	25.5	28,176	51.2	15.8	56,885	59.4	19.1
2. Special Services***	1,197	2.6	0.9	2,412	4.4	1.3	3,679	3.8	1.2
3. Library	1,400	3.0	1.1	1,627	3.0	0.9	4,[illegible]	4.5	1.4
4. Staff Offices	2,037	4.4	1.6	3,589	6.5	2.0	6,925	7.2	2.3
5. Large Mass Activity	37,929	82.1	29.3	37,210	67.6	20.8	52,686	55.0	17.7
a. Cafeteria	4,653	10.1	3.6	8,628	15.7	4.8	12,071	12.6	4.1
b. Auditorium	10,583	22.9	8.2	10,896	19.8	6.1	12,316	12.9	4.1
c. Gymnasium	22,693	49.1	17.5	17,686	32.1	9.9	28,299	29.5	9.5
6. Total building space exclusive of general utility (corridors, lounges, heating, storage, etc.)	88,759	192.1	68.6	99,886	181.5	55.8	163,337	170.5	54.7

* Percent of space for classrooms and laboratories.
** Excluding two Chicago schools for lack of data. Capital costs data are available and are shown in the attached table of Capital Costs.

TABLE 14

DISTRIBUTION OF CAPITAL COSTS

SENIOR HIGH SCHOOLS
(Constructed 1961-1963)

Components of Cost	Average of 2 Schools 1000 - 1499 Pupils			Average of 7 Schools 1500 - 2499 Pupils			Average of 6 Schools Above 2500 Pupils		
	Total Cost ($000)	Percent*	Cost per Pupil	Total Cost ($000)	Percent*	Cost per Pupil	Total Cost ($000)	Percent*	Cost per Pupil
Total Cost of Plant	$3,576	118.1%	$2,762	$3,684	109.6%	$1,985	$6,376	114.2%	$2,138
1 Site and Site Development	375	12.4	290	237	7.1	128	468	8.4	157
a Land	262	8.7	203	156	4.7	84	351	6.3	118
b. Demolition	0	0.0	0	13	0.4	7	0	0.0	0
c. Landscaping	113	3.7	87	68	2.0	37	117	2.1	39
2. Building and Furnishings	3,029	100.0	2,339	3,363	100.0	1,812	5,583	100.0	1,872
a. Construction and utilities	2,763	91.2	2,134	3,164	94.1	1,705	5,164	92.5	1,731
b. Furnishings for instruction	266	8.8	205	199	5.9	107	419	7.5	141
3. Administrative Costs	172	5.7	133	84	2.5	45	325	5.8	109
a. Architectural fees	143	4.7	110	79	2.4	42	298	5.3	100
b. Legal and others	29	1.0	23	5	0.1	3	27	0.5	9

* Percent of cost of building and furnishings.

SUMMARY

The traditional structure of educational costs explains expenditures more in terms of object than function. The operating budget is broken down into a number of categories such as general control, instruction, operation of plant, and fixed charges. While these classifications are useful, they do not provide combinations of costs which can be evaluated in relation to the natural order of organizing pupils, staff, and resources into operational programs.

This study makes a beginning toward development of a structure of costs which expresses functional components of programs. The most fundamental component is the instructional unit defined as a full-time teacher for a specified teaching area for a given number of pupils. Everything else--administration, specialized services such as counseling, facilities and equipment--may be evaluated in terms of supporting the teacher.

Only four instructional components are classified at the moment, regular and special programs in the elementary schools and high schools. Six special programs in which pupils receive most if not all of their instruction are identified. These are mentally and physically exceptional pupils, social adjustment centers, pre-kindergarten centers, continuation centers for dropouts, and vocational apprenticeship centers. Eventually it may be possible to count programs in smaller units such as special remedial classes or classes for the gifted in which a student participates for a small fraction of his time. At present these small components are averaged out in the regular program. The extent of them is not measured.

This approach calls for collection of new facts if a more detailed breakdown of costs is to be accomplished along functional lines. For example, retardation is a problem of such magnitude in some school systems that special programs are needed to cope with the situation outside of regular instructional

groups. There are many arrangements to tackle this problem. They include instruction on an individual basis, in special groups and in special schools. Counseling and guidance are essential. Counseling with parents is also essential. School systems have a vast amount of information on pupils for use in organizing their staff and resources. But the facts are not readily available for comparisons among systems or for estimating the total financial needs to cope with this problem.

Some of the recent experiments on retardation in the great cities are showing fantastic results. Here is a problem which can be defined, at least in large measure, in functional terms through classification and counting of pupils. Programs of operation can be undertaken and evaluation can be placed on the results.

Other components like this hold promise of being sorted out for estimation of needs, planning of action, and evaluation of results. By this method of induction the total operation of the school system can be laid out showing the costs of the respective parts. The four classifications of instructional programs provide a start in this direction.

The salaries of teachers may be viewed as the central core of costs. These can be evaluated in terms of all known principles of remuneration. All the variables in salary structure can be evaluated. These include such things as the minimum for beginning teachers, as well as, allowances for training and experience. The distribution of actual payments is determined by the combined effect of such variables. For example, a high rate of turnover of teachers depresses the total costs. Low turnover exerts steady rise of costs as more individuals move into higher brackets because of length of service. Thus the factors that shape the component of teachers' salaries can be analyzed for their effect on costs.

Other components likewise may be classified and measured as functionally as possible. Seven additional ones have been shown including salaries of non-teaching professional staff members. All of these add an average amount of operating cost equal to 92.33 per cent of teachers' salaries. In other words, for every dollar spent for direct payments to teachers, 92 cents are spent for other operating expenses. This proportion is not fixed. It may be expected to change.

The costs of new capital outlay likewise are broken down into components. The parts are arranged to show important differences from school to school and from one community to another. Factors such as high cost of sites explain the cause of variations in over-all costs.

In each case, whether current expense or capital outlay, the relationships of the component parts to total costs should serve two purposes. The first is to make a contribution to the evaluation of local school expenditures. The second is to provide a basis for making compensatory adjustments in intergovernmental fiscal policies for education.

APPENDIX

DISTRIBUTION OF SPACE AND COSTS IN SAMPLE OF NEW SCHOOL PLANTS BY CITY

TABLE 15

DISTRIBUTION OF BUILDING SPACE

A Sample of Elementary and Junior and Senior High Schools in Eleven Cities
(Constructed 1961-1963)

Type of Space	Baltimore				Boston	
	Elementary School		High Schools		Elementary Schools	
	One School		Average of 2 Schools		Average of 2 Schools	
	Amount of Space per Pupil: sq.ft.	Percent of Total Classroom and Lab. Space	Amount of Space per Pupil: sq.ft.	Percent of Total Classroom and Lab. Space	Amount of Space per Pupil: sq.ft.	Percent of Total Classroom and Lab. Space
1. Classroom and Lab.	29.7	100.0%	40.6	100.0%	29.0	100.0%
a. Classroom space	28.4	95.6	20.5	50.4	25.4	87.6
b. Laboratory space	1.3	4.4	20.1	49.6	3.6	12.4
2. Special Services	0.9	2.9	0.4	1.1	1.2	4.3
3. Library	2.0	6.6	1.7	4.2	0.0	0.0
4. Staff Offices	2.3	7.8	4.3	10.6	1.2	4.1
5. Large Mass Activity	12.1	40.6	13.7	33.8	10.6	36.5
a. Cafeteria*	4.4	14.8	4.8	11.8	0.0	0.0
b. Auditorium*	4.5	15.1	4.8	11.8	10.6	36.5
c. Gymnasium*	3.2	10.7	4.1	10.2	0.0	0.0
6. Total building space exclusive of general utility (corridors, lounges, heating, storage, etc.)	47.0	157.9	60.7	149.7	42.0	144.9

* Zeros may not mean complete absence of this type of space, but that it is provided in multipurpose rooms and reported under another heading.

Table 15 (Continued)

Type of Space	Cleveland				Detroit			
	Elementary Schools		High School		Elementary Schools		High Schools	
	Average of 7 Schools		One School		Average of 13 Schools		Average of 8 Schools	
	Amount of Space per Pupil: sq.ft.	Percent of Total Classroom and Lab. Space	Amount of Space per Pupil: sq.ft.	Percent of Total Classroom and Lab. Space	Amount of Space per Pupil: sq.ft.	Percent of Total Classroom and Lab. Space	Amount of Space per Pupil: sq.ft.	Percent of Total Classroom and Lab. Space
1. Classroom and Lab.	25.4	100.0%	21.4	100.0%	17.4	100.0%	32.7	100.0%
a. Classroom space	23.9	94.2	8.8	41.0	12.9	74.1	11.1	34.1
b. Laboratory space	1.5	5.8	12.7	59.0	4.5	25.9	21.6	65.9
2. Special Services	0.6	2.5	1.3	6.3	0.4	2.4	1.0	3.2
3. Library	0.2	0.9	1.1	5.1	1.1	6.4	1.8	5.3
4. Staff Offices	1.4	5.3	0.3	1.3	1.1	6.0	2.4	7.3
5. Large Mass Activity	5.2	20.4	8.5	39.6	5.4	31.0	20.2	61.8
a. Cafeteria*	0.0	0.0	2.9	13.4	0.0	0.0	6.9	21.2
b. Auditorium*	0.0	0.0	3.3	15.3	1.8	10.4	2.8	8.6
c. Gymnasium*	5.2	20.4	2.3	10.9	3.6	20.6	10.5	32.0
6. Total building space exclusive of general utility (corridors, lounges, heating, storage, etc.)	32.8	129.1	32.7	152.3	25.4	145.8	58.1	177.6

* Zeros may not mean complete absence of this type of space, but that it is provided in multipurpose rooms and reported under another heading.

Table 15 (Continued)

Type of Space	Houston				Los Angeles			
	Elementary Schools		High Schools		Elementary School		High Schools	
	Average of 15 Schools		Average of 6 Schools		One School		Average of 2 Schools	
	Amount of Space per Pupil: sq.ft.	Percent of Total Classroom and Lab. Space	Amount of Space per Pupil: sq.ft.	Percent of Total Classroom and Lab. Space	Amount of Space per Pupil: sq.ft.	Percent of Total Classroom and Lab. Space	Amount of Space per Pupil: sq.ft.	Percent of Total Classroom and Lab. Space
1. Classroom and Lab.	23.8	100.0%	29.5	100.0%	26.5	100.0%	39.7	100.0%
a. Classroom space	23.8	100.0	19.5	66.3	20.5	77.3	9.1	23.0
b. Laboratory space	0.0	0.0	10.0	33.7	6.0	22.7	30.6	77.0
2. Special Services	0.8	3.5	1.2	4.0	0.0	0.0	1.2	2.9
3. Library	1.0	4.3	0.8	2.8	2.9	11.1	2.8	6.9
4. Staff Offices	0.9	3.6	1.6	5.4	3.7	13.9	2.9	7.4
5. Large Mass Activity	8.0	33.6	26.0	87.9	9.1	34.2	21.2	53.4
a. Cafeteria*	8.0	33.6	4.6	15.7	1.1	4.2	2.5	6.4
b. Auditorium*	0.0	0.0	6.9	23.2	6.8	25.5	4.5	11.3
c. Gymnasium*	0.0	0.0	14.5	49.0	1.2	4.5	14.2	35.7
6. Total building space exclusive of general utility (corridors, lounges, heating, storage, etc.)	34.5	145.0	59.1	200.1	42.2	159.2	67.8	170.6

* Zeros may not mean complete absence of this type of space, but that it is provided in multipurpose rooms and reported under another heading.

Table 15 (Continued)

Type of Space	Milwaukee				New York			
	Elementary School		High Schools		Elementary Schools		High Schools	
	One School		Average of 2 Schools		Average of 3 Schools		Average of 5 Schools	
	Amount of Space per Pupil: sq.ft.	Percent of Total Classroom and Lab. Space	Amount of Space per Pupil: sq.ft.	Percent of Total Classroom and Lab. Space	Amount of Space per Pupil: sq.ft.	Percent of Total Classroom and Lab. Space	Amount of Space per Pupil: sq.ft.	Percent of Total Classroom and Lab. Space
1. Classroom and Lab.	21.7	100.0%	43.2	100.0%	25.8	100.0%	29.9	100.0%
a. Classroom space	21.7	100.0	19.5	45.1	25.8	100.0	12.1	40.4
b. Laboratory space	0.0	0.0	23.7	54.9	0.0	0.0	17.8	59.6
2. Special Services	1.0	4.7	0.9	2.1	1.4	5.3	2.5	8.4
3. Library	0.0	0.0	1.8	4.1	0.8	3.1	1.6	5.2
4. Staff Offices	0.8	3.6	1.2	2.6	1.6	6.2	2.5	8.4
5. Large Mass Activity	4.9	22.4	26.6	61.6	13.8	53.9	15.8	52.7
a. Cafeteria*	0.6	2.7	6.5	15.0	5.5	21.5	6.5	21.6
b. Auditorium*	4.3	19.7	5.6	13.0	4.7	18.4	4.4	14.8
c. Gymnasium*	0.0	0.0	14.5	33.6	3.6	14.0	4.9	16.3
6. Total building space exclusive of general utility (corridors, lounges, heating, storage, etc.)	28.4	130.7	73.7	170.4	43.4	168.5	52.3	174.7

* Zeros may not mean complete absence of this type of space, but that it is provided in multipurpose rooms and reported under another heading.

Table 15 (Continued)

Type of Space	Philadelphia				Pittsburgh		St. Louis	
	Elementary Schools		High Schools		Elementary Schools		High School	
	Average of 9 Schools		Average of 3 Schools		Average of 5 Schools		One School	
	Amount of Space per Pupil: sq.ft.	Percent of Total Classroom and Lab. Space	Amount of Space per Pupil: sq.ft.	Percent of Total Classroom and Lab. Space	Amount of Space per Pupil: sq.ft.	Percent of Total Classroom and Lab. Space	Amount of Space per Pupil: sq.ft.	Percent of Total Classroom and Lab. Space
1. Classroom and Lab.	24.7	100.0%	28.9	100.0%	25.3	100.0%	45.4	100.0%
a. Classroom space	24.2	97.9	13.8	47.6	15.0	59.4	13.9	30.6
b. Laboratory space	0.5	2.1	15.1	52.4	10.3	40.6	31.5	69.4
2. Special Services	2.5	10.3	1.1	3.8	0.6	2.5	2.0	4.3
3. Library	0.2	1.0	1.1	3.8	1.4	5.6	2.4	5.4
4. Staff Offices	1.0	3.8	1.9	6.4	1.4	5.6	1.7	3.7
5. Large Mass Activity	7.9	31.8	15.2	52.6	6.3	25.0	34.9	76.8
a. Cafeteria*	1.9	7.7	3.4	12.0	0.0	0.0	8.1	17.8
b. Auditorium*	2.8	11.3	4.1	14.1	0.0	0.0	9.4	20.6
c. Gymnasium*	3.2	12.8	7.7	26.5	6.3	0.0	17.4	38.4
6. Total building space exclusive of general utility (corridors, lounges, heating, storage, etc.)	36.3	146.9	48.2	166.6	35.0	138.7	86.4	190.2

* Zeros may not mean complete absence of this type of space, but that it is provided in multipurpose rooms and reported under another heading.

TABLE 16

DISTRIBUTION OF CAPITAL COSTS

A Sample of Elementary and Junior and Senior High Schools in Twelve Cities
(Constructed 1961-1963)

Components of Cost	Baltimore				Boston	
	Elementary School		High Schools		Elementary Schools	
	One School		Average of 2 Schools		Average of 2 Schools	
	Cost per Pupil	Percent of Total Building Cost	Cost per Pupil	Percent of Total Building Cost	Cost per Pupil	Percent of Total Building Cost
Total Cost of Plant	$1,474	112.6%	$1,884	107.5%	$1,862	122.0%
1. Site and Site Development	123	9.4	59	3.4	221	14.5
a. Land	122	9.4	51	3.0	164	10.8
b. Demolition	0	0.0	0	0.0	57	3.7
c. Landscaping	1	0.0	8	0.4	0	0.0
2. Building and Furnishings	1,309	100.0	1,752	100.0	1,526	100.0
a. Construction and utilities	1,185	90.6	1,488	84.9	1,449	95.0
b. Furnishings for instruction	124	9.4	264	15.1	77	5.0
3. Administrative Costs	42	3.2	73	4.1	115	7.5
a. Architectural fees	28	2.1	65	3.7	115	7.5
b. Legal and others	14	1.1	8	0.4	0	0.0

Table 16 (Continued)

Components of Cost	Chicago*				Cleveland			
	Elementary Schools		High Schools		Elementary Schools		High School	
	Average of 12 Schools		Average of 2 Schools		Average of 7 Schools		One School	
	Cost per Pupil	Percent of Total Building Cost	Cost per Pupil	Percent of Total Building Cost	Cost per Pupil	Percent of Total Building Cost	Cost per Pupil	Percent of Total Building Cost
Total Cost of Plant	$1,520	127.8%	$2,447	115.1%	$984	137.0%	$1,565	125.6%
1. Site and Site Development	275	23.1	288	13.5	266	37.0	319	25.6
a. Land	239	20.1	269	12.6	266	37.0	319	25.6
b. Demolition	8	0.7	14	0.7	0	0.0	0	0.0
c. Landscaping	28	2.3	5	0.2	0	0.0	0	0.0
2. Building and Furnishings	1,189	100.0	2,126	100.0	718	100.0	1,246	100.0
a. Construction and utilities	1,130	95.0	2,052	96.5	711	99.0	1,246	100.0
b. Furnishings for instruction	59	5.0	74	3.5	7	1.0	0	0.0
3. Administrative Costs	56	4.7	33	1.6	0	0.0	0	0.0
a. Architectural fees	56	4.7	33	1.6	0	0.0	0	0.0
b. Legal and others	0	0.0	0	0.0	0	0.0	0	0.0

* Data on distribution of space are not available from Chicago.

Table 16 (Continued)

Components of Cost	Detroit				Houston			
	Elementary Schools		High Schools		Elementary Schools		High Schools	
	Average of 13 Schools		Average of 8 Schools		Average of 15 Schools		Average of 6 Schools	
	Cost per Pupil	Percent of Total Building Cost	Cost per Pupil	Percent of Total Building Cost	Cost per Pupil	Percent of Total Building Cost	Cost per Pupil	Percent of Total Building Cost
Total Cost of Plant	$1,137	141.4%	$2,363	123.7%	$556	112.5%	$1,388	109.2%
1. Site and Site Development	270	33.5	327	17.1	43	8.6	62	4.9
a. Land	218	27.1	234	12.2	27	5.5	0	0.0
b. Demolition	9	1.1	8	0.4	0	0.0	0	0.0
c. Landscaping	43	5.3	85	4.5	16	3.1	62	4.9
2. Building and Furnishings	804	100.0	1,910	100.0	494	100.0	1,272	100.0
a. Construction and utilities	768	95.5	1,787	93.6	468	94.8	1,196	94.1
b. Furnishings for instruction	36	4.5	123	6.4	26	5.2	76	5.9
3. Administration Costs	63	7.9	126	6.6	19	3.9	55	4.3
a. Architectural fees	42	5.2	96	5.0	19	3.9	55	4.3
b. Legal and others	21	2.7	30	1.6	0	0.0	0	0.0

Table 16 (Continued)

Components of Cost	Los Angeles				Milwaukee			
	Elementary School		High Schools		Elementary School		High Schools	
	One School		Average of 2 Schools		One School		Average of 2 Schools	
	Cost per Pupil	Percent of Total Building Cost	Cost per Pupil	Percent of Total Building Cost	Cost per Pupil	Percent of Total Building Cost	Cost per Pupil	Percent of Total Building Cost
Total Cost of Plant	$1,339	163.3%	$2,236	135.9%	$841	119.4%	$2,117	110.5%
1. Site and Site Development	477	58.2	489	29.7	92	13.0	89	4.6
a. Land	306	37.4	278	16.9	69	9.7	26	1.4
b. Demolition	0	0.0	0	0.0	0	0.0	0	0.0
c. Landscaping	171	20.8	211	12.8	23	3.3	63	3.2
2. Building and Furnishings	821	100.0	1,646	100.0	704	100.0	1,915	100.0
a. Construction and utilities	752	91.6	1,473	89.5	661	93.9	1,773	92.6
b. Furnishings for instruction	69	8.4	173	10.5	43	6.1	142	7.4
3. Administrative Costs	41	5.1	101	6.2	45	6.4	113	5.9
a. Architectural fees	41	5.1	68	4.2	45	6.4	113	5.9
b. Legal and others	0	0.0	33	2.0	0	0.0	0	0.0

Table 16 (Continued)

Components of Cost	New York				Philadelphia			
	Elementary Schools		High Schools		Elementary Schools		High Schools	
	Average of 3 Schools		Average of 5 Schools		Average of 9 Schools		Average of 3 Schools	
	Cost per Pupil	Percent of Total Building Cost	Cost per Pupil	Percent of Total Building Cost	Cost per Pupil	Percent of Total Building Cost	Cost per Pupil	Percent of Total Building Cost
Total Cost of Plant	$2,365	132.1%	$2,379	111.1%	$1,116	116.1%	$2,016	110.7%
1. Site and Site Development	529	29.5	171	8.0	86	9.0	84	4.6
a. Land	510	28.5	167	7.8	83	8.7	84	4.6
b. Demolition	19	1.0	4	0.2	3	0.3	0	0.0
c. Landscaping	0	0.0	0	0.0	0	0.0	0	0.0
2. Building and Furnishings	1,790	100.0	2,143	100.0	961	100.0	1,821	100.0
a. Construction and utilities	1,736	97.0	1,988	92.7	925	96.3	1,692	92.9
b. Furnishings for instruction	54	3.0	155	7.3	36	3.7	129	7.1
3. Administrative Costs	46	2.6	65	3.1	69	7.1	111	6.1
a. Architectural fees	46	2.6	65	3.1	57	5.9	103	5.6
b. Legal and others	0	0.0	0	0.0	12	1.2	8	0.5

Table 16 (Continued)

Components of Cost	Pittsburgh — Elementary Schools — Average of 5 Schools — Cost per Pupil	Pittsburgh — Elementary Schools — Average of 5 Schools — Percent of Total Building Cost	St. Louis — High School — One School — Cost per Pupil	St. Louis — High School — One School — Percent of Total Building Cost
Total Cost of Plant	$1,913	125.0%	$3,176	126.2%
1. Site and Site Development	301	19.6	543	21.6
a. Land	268	17.5	456	18.1
b. Demolition	13	0.9	0	0.0
c. Landscaping	20	1.2	87	3.5
2. Building and Furnishings	1,530	100.0	2,517	100.0
a. Construction and utilities	1,435	93.8	2,169	86.2
b. Furnishings for instruction	95	6.2	348	13.8
3. Administrative Costs	82	5.4	116	4.6
a. Architectural fees	82	5.4	116	4.6
b. Legal and others	0	0.0	0	0.0